IN THE SPECIFICATION:

Please amend paragraphs [006], [007], [011], [019], [021], [025]-[032], [036], [038], [039], [041]-[043], [045] and add paragraph [046] as shown below, in which deleted terms are shown with strikethrough and added terms are shown with underscoring. Also amend the headings between paragraphs [001]-[002] and [030]-[031] as shown below.

Headings Between Paragraphs [001]-[002]

Description of the ~~Prior~~ Background Art

Paragraph [006]

There is also known a paddle developing method by which a developing solution and nitrogen (air) are supplied to a nozzle via separate pipes and the developing solution is sprayed in spray form, thus permitting high accuracy development treatment. (Patent Document 2)

Paragraph [007]

There is further known a paddle developing method by which a developing solution supply pipe and a gas supply pipe are caused to face an umbrella-like concave portion formed at the bottom end of a nozzle and a developing solution is supplied to a substrate in the form of a high velocity mist. (Patent Document 3)

Paragraph [011]

Furthermore, although it is possible to maintain the temperature of a developing solution at a predetermined level until the moment the developing solution is delivered, the temperature and concentration of the solution change due to vaporization after the delivery, with the result that it is difficult to maintain a prescribed performance of the developing solution, and posing the problem that an unevenness of development tends to occur.

Paragraph [019]

Incidentally, conceivable variations of the developing apparatus are a developing

apparatus which is configured to have a blower which feeds the temperature-adjusted air into the developing apparatus and a preheating device which beforehand heats the object to be treated before the transfer of this object into the developing apparatus, and a developing apparatus which is configured in such a manner that a nozzle which spouts a developing solution in mist form is disposed with an antiscattering ~~cone~~ cup.

Paragraph [021]

The following table (Table 1 appearing just before the claims) shows a comparison of the treatment time, the amount of a solution used and the possibility of uniform development between the apparatus of the present invention (air nozzle: 40°C) and conventional apparatus (paddle type and shower type) when PMER LA-900 made by Tokyo Ohka Kogyo Co., Ltd. was used as a photoresist, PMER-7G made by the same company was used as a developing solution and a 5 inch wafer was used as the substrate size.

Paragraph [025]

FIG. 4 is a view to explain a piping system according to the invention;

Paragraph [026]

FIG. 5 is an enlarged sectional view of a temperature regulating portion (heater) ~~of~~ for an applied solution according to the invention;

Paragraph [027]

FIG. 6(a) is a partial enlarged view ~~as with~~ similar to that in FIG. 2, in which a convex projecting body is provided on the bottom surface of a cup;

Paragraph [028]

FIG. 6(b) is a plan view of a chuck portion of the apparatus in Fig. 6(a) observed from above;

Paragraph [029]

FIG. 6(c) ~~is an~~ includes enlarged explanatory views of a section ~~45~~ of the chuck portion indicated at 45 in Fig. 6(a); and

Paragraph [030]

FIG. 7(a) to FIG. 7(c) are ~~each a~~ various views of projections provided ~~in~~ with a spinner according to an embodiment of the invention.

Heading Between Paragraphs [030]-[031]

DETAILED DESCRIPTION OF THE ~~PREFERRED EMBODIMENTS~~ INVENTION

Paragraph [031]

Embodiments of the present invention will be described below ~~on the basis of~~ in conjunction with the attached drawings. FIG. 1 is a general view of a developing apparatus related to the present invention. FIG. 2 is a partial enlarged view of the same developing apparatus. FIG. 3 is an enlarged view of a tip portion of a nozzle. FIG. 4 is a view to explain a piping system. FIG. 5 is an enlarged sectional view of a temperature regulating portion.

Paragraph [032]

In the developing apparatus, a chuck device 2 and a nozzle device 3 are arranged within a case 1 and a hot plate (heater) 4, a blower 5 and a temperature regulator 6 are arranged outside the case 1. The hot plate 4 performs the pre-heating of a substrate W to be treated before treatment, and the blower 5 feeds the air which is regulated to not less than 30°C but less than 60°C into the case 1 via a blast pipe 7 and a filter 8. Circulation paths 9, 10 of ~~the~~ temperature-regulated water, which is regulated to not less than 30°C but less than 60°C, lead from the temperature regulator 6. The temperature of the chuck device 2 is regulated by the circulation path 9, as will be described later, and the temperature of the developing solution supply pipe leading to the nozzle device 3 is regulated by the circulation path 10, as will be described later.

Paragraph [036]

On the other hand, in the above-described nozzle device 3, a spray nozzle 33 is attached to a horizontally reciprocating arm 31 via a columnar support 32. A developing solution pipe 34 and an air supply pipe 35 are inserted into this spray nozzle 33 (see Fig. 3) and a temperature-regulated developing solution from the developing solution supply pipe 34 is spouted in mist form from the bottom end of the spray nozzle 33.

Paragraph [038]

FIG. 4 is a view to explain the piping system and FIG. 5 is an enlarged sectional view of a temperature regulating portion (heater) ~~of~~ for an applied solution. The developing solution supply pipe 34 and the air supply pipe 35 are each provided with a valve, and heaters 37, 38 are provided on the upstream side of each of the valves and a buffer tank 39 is provided particularly at a midpoint in the developing solution supply pipe 34. In the buffer tank 39, by monitoring the amount of the developing solution by use of a liquid level sensor not shown in the figure, it is possible to supply a developing solution which is constantly stable without a shortage of the solution.

Paragraph [039]

As shown in FIG. 5, the above-described heater 37 ~~is~~ may be of a double-pipe construction in which the developing solution supply pipe 34 is inserted in a pipe which constitutes the circulation path 9 of temperature-regulated water so that the temperature of the developing solution can be arbitrarily controlled in the range of not less than 30°C but less than 60°C. Incidentally, it is advisable that to ensure that the stream or flow direction of the temperature-regulated water is opposed to the stream of the developing solution as shown.

Paragraph [041]

FIG. 6(a) to FIG. 6(c) show an example in which a projecting body 40 which prevents the developing solution from flowing behind a rear surface of the wafer is provided. FIG. 6(a) is a view similar to FIG. 2 which shows another embodiment of the invention, FIG. 6(b) is a plan

view of the ~~support~~ chuck portion, and FIG. 6(c) ~~is a~~ are views to explain the action of the projections.

Paragraph [042]

In this embodiment, the spinner 22 permits the temperature holding and rotation of the substrate W, which is the object to be treated, and the support portion 21 serves to hold the temperature of the substrate W to be treated. The height of the support portion 21 is a little lower than the height of the spinner 22. Because the support portion 21 is a little lower, a surplus developing solution etc. may flow behind the rear surface of the wafer W, which is the object to be treated. For this reason, it is desirable to provide a ring-shaped projecting body 40 with a gap of about 1 mm from the lower or rear surface of the wafer W to be treated in a position which is nearest to the outside diameter or periphery of the support portion 21 and is within 10 mm from the outermost ~~side~~ edge of the wafer W to be treated. This ~~enables~~ prevents the developing solution etc. from flowing behind the rear surface of the substrate W to be treated due to surface tension. As shown, the projecting body is provided on a bottom (upper) surface of the cup facing toward the lower surface of the object to be treated.

Paragraph [043]

FIG. 7(a) to FIG. 7(c) show another embodiment of the invention for preventing the developing solution from flowing behind the rear surface of the substrate to be treated. FIG. 7(a) is a side expanded view a spinner 22 with ~~a projecting body 44~~ projections 41. FIG. 7(b) is a plan view of FIG. 7(a) and FIG. 7(c) shows a path in which the developing solution flows down without flowing behind the rear surface of the substrate to be treated. In this embodiment, projections 41 are provided in a plurality of places on the outside of the spinner 22 present on the rear surface side of the substrate W to be treated in such a manner that the projections do not interfere with other members by the mounting and rotation of the substrate W to be treated. The rotation of the spinner 22 with the projections 41 causes air currents to be generated toward the outside diameter on the rear surface of the wafer W to be treated. Because in the region of the rear surface of the wafer, the gap between the substrate W to be treated and the chuck is as

narrow as 1 mm or so in areas other than the portion where the spinner 22 is housed, this provides the amplification effect that the wind force is amplified when the air flows out to the peripheral part of the wafer. Therefore, it is possible to cause the developing solution etc. to scatter efficiently and, at the same time, it is possible to prevent the developing solution etc. ~~to flow~~ from flowing behind the rear surface of the substrate W to be treated. The wind volume generated by the multiple projections 41 attached to the spinner 22 is not so large as described in Patent Document 4 and Patent Document 5. However, due to the above-described amplification effect, it is possible to generate air currents of wind force large enough to prevent the developing solution flying from the front surface of the wafer W to be treated from flowing behind the rear surface of the wafer W to be treated. The corners of the projections 41 are rounded to reduce the air resistance and hence to minimize the load to the spinner 22.

Paragraph [045]

By providing the convexities or projecting body 40, and projections 41 on the spinner 22 and the bottom surface of the cup, it is possible to prevent the developing solution from flowing behind the rear surface of the wafer.

Paragraph [046]

Although there have been described what are the present embodiments of the invention, it will be understood that variations and modifications may be made thereto without departing from the spirit or essence of the invention.